COCHLEAR IMPLANT BRAND	ADVANCED BIONICS **Current Model** HiRes 90K Implant Family: HiRes 90K Released (July 2003) HiRes 90K Advantage (Released Sept 2012)	COCHLEAR (NUCLEUS) **Current Model:** Nucleus System – includes CI24RE (Released September 2005) and CI422 (Released March 2012)	MED-EL **Current Model** MAESTRO System - includes PULSARci100 (Released August 2005), SONATAti100 (Released June 2007) and CONCERT (September 2011) implants
COMPANY INFORMATION			
Website	http://www.advancedbionics.com	http://www.cochlear.com	http://www.medel.com/
Location of Headquarters	North American Headquarters Advanced Bionics LLC 28515 Westinghouse Place, Valencia, CA 91355, United StatesT: +1.877.829.0026 T: +1.661.362.1400 F: +1.661.362.1500 info.us@AdvancedBionics.com Global Headquarters Advanced Bionics AG Laubisrütistrasse 28, 8712 Stäfa, Switzerland T: +41.58.928.78.00 F: +41.58.928.78.90 info.switzerland@AdvancedBionics.com Advanced Bionics Asia Pacific Ltd Room 4103, 41/F, Hopewell Centre 183 Queen's Road East Wanchai, Hong Kong T: +852.2526.7668 F: +852.2526.7628info.hongkong@AdvancedBionics.com Advanced Bionics Sucursal Colombia	Main Headquarters: 14 Mars Road PO Box 629 Lane Cove NSW 2066 AUSTRALIA North America: 13059 E. Peakview Ave. Centennial, CO 80111 European Region (including Saudia Arabia and the Middle East) Cochlear AG Peter Merian-Weg 4 4052 Basel Switzerland See http://www.cochlearamericas.com/Support/405.asp for complete list	Main Headquarters: Fürstenweg 77a A-6020 Innsbruck Austria USA: 2511 Old Cornwallis Rd. Suite 100 Durham, North Carolina 27713 See http://www.medel.com/us/show2/index/id/294/titel/MED-EL+Offices+Worldwide for complete list

	Carrera 7 No. 83-29 Ofinica 902 Bogota, Colombia +571.691.59.00/05/14 +571.621.84.42. Fax LA@AdvancedBionics.com See: http://www.advancedbionics.com/com/en/system/topnav/contact.html		
Year Started in Business	1993	1981 (Global Headquarters) 1984 (Cochlear Americas)	1989
PERFORMANCE			
Number of Electrodes	16 + 2 grounding	22 intracochlear electrodes +2 grounding	24 contacts + 2 grounding for traditional electrodes 19 contacts + 2 grounding for Flex electrodes
Internal Implant Materials	Titanium and silicone	Titanium and silicone	PULSAR: Ceramic and silicone SONATA: Titanium and silicone CONCERT: Titanium and silicone
Processing Strategies	CIS, MPS, HiRes™, HiRes Fidelity 120™, ClearVoice™, HiRes™ Optima Sound Processing (120 & ClearVoice, Optima not FDA approved for pediatric users in the U.S.)	Hi-Ace (CI24RE, CI422, CI500) Ace (N24, CI24RE, CI422, CI500) SPEAK (N22, N24, CI24RE, CI422, CI500)	FSP (Fine Structure Processing) and HDCIS (High Definition Continuous Interleaved Sampling. FSP is not indicated for use in prelingual children.
Stimulation type(s) and Rate	*Up to 83,000 Pulses Per Second (PPS) *Up to 120 Spectral Bands of Information HiRes-P (Paired)	Sequential stimulation 32,000 hertz	Sequential stimulation at a maximum rate of 50,704 pps.

	HiRes-S (Sequential) HiRes Fidelity 120-P (Paired) HiRes Fidelity 120-S (Sequential) CIS and MPS SAS (C1-Harmony)		
Independent Current Sources	16 independent	Single	Multiple
Possible Number of Pitch Percepts	HiRes 120 is intended to allow implant users to take advantage of their residual place-pitch perception capabilities. Using current steering, up to 120 spectral bands are delivered to the cochlea. This increased spectral resolution, in combination with the fine temporal resolution already implemented in HiRes, provides better speech perception in noise and improved music appreciation.[1]	Average aggregate # discriminable pitches across the entire array: 161[2] [3] When intensity was roved to eliminate loudness cues: 127 discriminable pitches across the entire array.[4]	Scientific studies have demonstrated that FineHearing™ enables hearing implant recipients to detect small differences in pitch – for example, between two neighboring piano notes. Fine Structure Processing allows better pitch perception, especially in the low frequencies. MED-EL coding strategies can deliver up to 250 distinct pitches. Fine Structure Processing allows better pitch perception, especially in the low frequencies.[5]
Speech Perception Scores *Speech perception scores vary greatly from recipients to recipients, as it largely depends on the hearing loss background. Rehabilitation is the key to seeing the best outcome.	59%, AB Words at 70 dB SPL[6] 87%, CUNY Sentences at 70 dB SPL[7]	69%, AB Words at 70 dB SPL (Freedom Sound Processors – Previous Generation)[8] 96%, CUNY Sentences at 70 dB SPL (Freedom Sound Processors – Previous Generation)[9]	71%, AB Words at 70 dB SPL[10] 98%, CUNY Sentences at 70 dB SPL[11]
Everyday Hearing	Autosound-technology that adapts dynamically and continuously to every environment, making it easier for you	SmartSound iQ – SmartSound iQ includes a fully automated sound management system, which is also	Switch-free design prevents inadvertent changes to program or volume settings. Because of the

	to hear your best no matter where you are. So when sound levels change, such as from a quiet conference room to a loud crowded restaurant, AutoSound automatically adjusts the sound level just like a normal-hearing ear.[12] Additionally, ClearVoice™ a processing strategy which is built on AB's proprietary HiRes Fidelity 120™ technology, has been designed to automatically analyze and adapt to each listening situation that you encounter throughout the day, as an every day program, separating the distracting noises from what you want to hear most—speech.[13] QuickSync: One-touch control of two processors. Ideal for bilateral hearing, the QuickSync feature from Phonak allows for easy, instant, simultaneous adjustments to volume and program settings on both Naída CI Q70 (Naída CI) sound processors.[14]	known as SCAN. This means that the sound processor will automatically switch the programs based on different listening situations.[15] Adaptive Dynamic Range Optimization (ADRO) – ADRO is like an equalizer on stereo, using incredibly fast signal rates to automatically adjust sound levels across each of internal cochlear implant's 22 channels individually. The individual channels representing quiet sounds are turned up, while loud sounds are softened.[16] Auto-sensitivity (ASC) - Auto-sensitivity automatically adjusts the microphone sensitivity setting in response to the level of incoming noise; it dampens down the level of background noise, allowing you to better understand speech.[17]	Automatic Sound Management feature, most users do not need to change settings during the day and therefore do not need to carry the FineTuner remote control with them. This feature is especially useful for small children who can't be responsible for manually adjusting their processor based on the environment. Fine Structure Processing is a coding strategy that processes quiet, noise, and music very well. Users do not have to push any buttons or change programs to switch from music listening to speech or from quiet environment to noise. The Fine Tuner remote control can manage settings for two audio processors, so bilateral implant users can adjust volume, sensitivity or program on both processors simultaneously if desired. The telecoil feature can be used on any program, no special settings are required.
Hearing in Noise	ClearVoice-Improved speech clarity in noisy settings. Easier more effortless listening in	SmartSound iQ – SmartSound iQ includes a fully automated sound management	FineHearing provides benefits to users for hearing in noise. Automatic Sound

	real-world settings. Outstanding hearing from morning to evening with no adjustments needed.[18] HiRes Fidelity 120™: Designed to provide hearing that closely resembles how a normal ear hears, AB's HiRes Fidelity 120 sound processing captures and delivers the three dimensions of sound for a more complete hearing experience.[19] AutoSound- a combination of AB's Wide IDR (Input Dynamic Range) of 80dB and dual-loop Automatic Gain Control (AGC), adjusts acoustic input for comfort and audibility without requiring processor adjustments.[20] T-Mic™- a microphone placed optimally at the opening of the ear to take advantage of the outer ear's natural sound-collecting abilities to gather life's vivid sounds. T-Mic provides help for hearing in noise-the T-Mic is designed to help you or your child hear better in common noisy environments, such as classrooms, restaurants, and sporting events.[21]	system, which is also known as SCAN. This means that the sound processor will automatically switch the programs based on different listening situations.[24] Noise – SmartSound iQ recognizes annoying constant background noise and suppresses it, allowing speech to pass through. [25] Zoom/Speech in noise – A dual microphone technology with intelligent processing that is designed to lessen competing noise, making the sounds you want to hear clearer — similar to natural hearing. This feature is designed to make it easier than ever to hear in noisy listening situations. [26] Auto-sensitivity (ASC) - Auto-sensitivity automatically adjusts the microphone sensitivity setting in response to the level of incoming noise; it dampens down the level of background noise, allowing you to better understand speech.[27] Wind – With SmartSound iQ and the help of two microphones, the wind-related noise is	Management adjusts the processor based on the listening environment of the user. This means that listeners do not typically have to make manual adjustments to their processor throughout the day.[31]

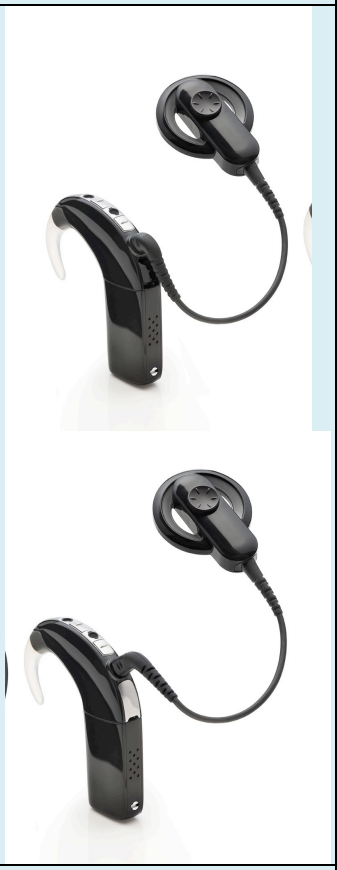
	UltraZoom - This dual microphone technology pioneered by Phonak is designed to focus on sound from a speaker located in front of the listener for improved speech understanding in noisy settings.[22] ZoomControl – designed to zoom in on a speaker located on your left or right for clearer speech understanding in noisy settings.[23]	suppressed. [28] Adaptive Dynamic Range Optimization (ADRO) – ADRO is like an equalizer on stereo, using incredibly fast signal rates to automatically adjust sound levels across each of internal cochlear implant's 22 channels individually. The individual channels representing quiet sounds are turned up, while loud sounds are softened.[29] Beam – With the dual microphone technology and SmartSound iQ, Beam enhances the sounds in front of the recipient and softens those coming from other directions.[30]	
Music Appreciation	HiResolution is designed to preserve the broad spectrum of sounds to enhance music appreciation. ClearVoice™ provides enhanced lyric understanding for music enjoyment.[32] AutoSound makes listening to music effortless by automatically capturing and delivering the softest and loudest sounds. AutoSound's programmable wide Input Dynamic Range (IDR) and automatic volume control adjust automatically so that	SmartSound iQ recognizes the music and balances the recipient's need to understand lyrics with the broader music experience. [34] Music setting pairs Whisper, a wide dynamic range compression system, and ADRO, to help make the softer musical passages easier to hear and the overall music sound level more balanced.	FineHearing provides users with specific cues for the fine timing details of sounds, which are especially important for the enjoyment of music. 92% of MED-EL users report that music is pleasant to listen to, and 84% report listening to music every week if not every day.[35]

	you don't miss a note.[33]		
Microphone	AB is the only company to offer the patented T-Mic™ microphone placed at the opening of the ear canal. This strategic placement utilizes the outer ear's natural sound-gathering capabilities, just like normal-hearing ears. The result is better, more effortless hearing for your child or you in noise. In total Naída CI Q70 has four microphones: the T-Mic™ 2, a front and back built-in microphones and the (UHP) headpiece mic.[36] Neptune™ has a microphone built into the headpiece and is offered in two options: a dry configuration called the Universal Head Piece (UHP) and a swimming configuration called the AquaMic. Neptune and PSP also have access to AB's T-Mic and T-Coil technology via the T-Comm™ ear level accessory.[37]	Two microphones for better quality sound and direction - A front and rear microphone, both omni directional to capture sound from a both in front and in back of the user. Designed to capture sound from all around.	MED-EL's processors feature an omni-directional microphone, which captures sound from all directions.
Telemetry	Neural Response Imaging (NRI)- Measures the electrically evoked compound action potential (ECAP) of the hearing nerve. It is designed to optimize and aid the implant	AutoNRT™ (Automated Neural Response Telemetry) enables your specialist to confirm the precise placement of the stimulation contacts by measuring your hearing nerve response.	Impedance and Field Telemetry (IFT) provides an objective measure of implant function while Auditory Nerve Response Telemetry (ART™) measures the electrically evoked

	fitting process.		compound action potential (ECAP) generated by the auditory nerve.
Electrode Arrays Available	HiFocus™ 1J HiFocus™ Helix HiFocus™ Mic-Scala HiFocus™ Electrode features 16 platinumiridium contacts that focus stimulation on the hearing nerve fibers.[38]	Contour Advance Electrode with self curling array (CI24RE)[39] Double electrode array for ossified cochlea[40] Straight Slim electrode array (CI422)[41]	Standard electrode array Medium electrode array Compressed electrode array Split electrode array FLEX 24 electrode array FLEX 28 electrode array Although all MED-EL electrodes are designed to be altramatic, the FLEX electrodes are specially designed to preserve residual hearing and delicate cochlear structures. The variety of lengths of MED-EL electrodes ensure complete cochlear coverage for every patient.
Input Dynamic Range[42]	Up to 80 db[43]	Up to 75 db	55 db Adaptive sound window moves within a 75 db IDR.[44]
RELIABILITY			
Reliability – Cumulative failures (Company Reported)	HiRes 90K at 6 years out post recall Vendor A – all failures: 1.9% HiRes 90K at 8 years out Vendor B – all failures: 37.7%[45] Clarion II at 10 years out – all failures: 4% Clarion 1.2 at 15 years	Freedom at 7 years out – all failures: 0.8%[47] Nucleus 24 at 12 years out – all failures: 2.6%[48] Nucleus 22 at 25 years out – all failures: 6.8%[49] Nucleus 5 at 3 years out – all failures: 4.5%[50]	Concerto at 2 years out: 0.03% (device issues only) 0.15% (device + accident) 1.19% (device + medical, surgical & accident)[51] Sonata at 5 years out: 0.25% (device issues only)

	out – all failures: 20.1%[46]		1.28% (device + accident) 3.07% (device + medical, surgical & accident)[52] Pulsar at 8 years out: 0.21% (device issues only) 3.66% (device + accident) 7.74% (device + medical, surgical & accident)[53]
Relevant Reliability Information	AB cochlear implants that are implanted today demonstrate high reliability with a 99.8% one-year cumulative survival rate (CSR) measured as dictated by the international standard. AB adheres to the most conservative interpretation of the industry reliability standard, counting all devices removed for nonmedical reasons as failures according to global consensus. AB's CSR includes all "soft" failures in situ failures, and electrode issues that other manufacturers may exclude in their reporting. AB also provides a Failure Analysis Report for every explanted device clearly indicating whether the device is counted against the CSR.[54]	Cochlear manufactures all of its own parts and does not rely on an outside vendor. Reports on all of its devices, Nucleus 22 and beyond. Reports on hard and "soft" failures.	MED-EL reports on all devices, including both hard and "soft" failures, according to the relevant ISO standard and the international consensus committees' recommendations. MED-EL also offers transparent information about the type of failure (device failure, surgical or medical complication, or accident-related failure) with that data available to be viewed by anyone on medel.com.

Past Recalls with Year Recall Announced	2010: The HR90K implant was voluntarily recalled due to 2 instances out of 28,000 devices where the internal device was explanted due to malfunction. 2009: Metal case surrounding internal magnet may be not welded properly leading to decrease in magnet strength over time for some magnets manufactured in 2005.[55] 2006: The HR90K implant was voluntarily recalled due to elevated internal moisture associated with a feedthru component from an approved supplier (Vendor B). 2004: Recall due to moisture trapped inside the titanium receiver-stimulator leading to failure.[56] 2002: Recall due to positioner increasing risk of meningitis. This recall pertains only to Clarion, an older internal cochlear implant, which is no longer available on the market.[57]	2011: "In December 2011 and February 2012, we reported the failure mechanism as a loss of hermeticity which results in the malfunction of specific electronic components (typically one of four diodes). Failure of these electronic components results in the implant shutting down. No other failure mechanism associated with the loss of hermeticity has been identified." This recall pertains only to CI500 series internal cochlear implant, which is not available on the market.[58] 1995: Power supply inside the implanted part of the cochlear implant malfunctioned causing some devices to fail. This recall pertains only to Nucleus 22, an older internal cochlear implant, which is no longer available on the market.[59]	
Processor Reliability	Data will be provided in the next reliability report	No Data Available	RONDO: No data yet Opus 2: Average monthly service rate = 0.54%

			Opus 1: 0.97%
PROCESSOR EASE OF USE			
Processors (Most recent models only)	Naída CI Q70 BTE sound processor[60] Neptune™ swimmable freestyle™ sound processor[61]	Nucleus 6 System – CP910 and CP920	RONDO – Single-Unit Processor Opus 2 BTE + various configurations for wearing processor
Processor Photo			
Processor Remote Control	AB myPilot - Instant control and status information—This easy-to-use remote control offers status information and one-touch changes to programs, volume, and sensitivity settings.[62]	Yes (Bidirectional Communication between Processor and Wireless remote assistant) o	Yes (Unidirectional Remote to processor only)

Wireless Communication Accessories	Phonak ComPilot- Wireless streaming accessory—The ComPilot offers advanced features and functionality that link you seamlessly to Bluetooth products, mobile phones for hands-free device use, computers, media players, TVs, navigation systems, FM, and countless other devices. AB myPilot- Instant control and status information—This easy-to-use remote control offers status information and one-touch changes to programs, volume, and sensitivity settings. Phonak TVLink- The ideal TV experience—The Phonak TVLink	Cochlear licensed GN ReSound's 2.4 GHz wireless technology. This wireless technology is implemented in the Nucleus 6 Sound Processor. This system will allow recipients connect to cellphones, TV and electronics wirelessly. [65] Telephone: There is a clip that will link the phone to the sound processor wirelessly. TV: There is an adapter to attach to the TV to wirelessly link to the sound processor. There is no additional accessory to link between the adapter and the sound processor. Micrphone/FM: No accessory is needed to connect to the microphone. All of the wireless communication accessories can be streamed into both	All MED-EL processors are compatible with all commercially available assistive listening devices, as well as most cellular phones and similar technologies. Wireless connections can be made using either telecoil, or Bluetooth using a 3rd party Bluetooth receiver.

	accessory with the ComPilot streams high-quality audio directly to sound processor(s) or a Phonak hearing aid while recipients enjoy their favorite shows and movies. Phonak RemoteMic- The wireless solution for noisy places—The lightweight RemoteMic with the ComPilot takes the strain out of one-on-one conversations in noisy places by streaming speech directly to one or both ears. Music, FM, phone calls, TV shows, and endless other media can be wirelessly streamed to	Nuclues 6 sound processor and ReSound's hearing aid. Wireless technology range: 7 meters	

	both a compatible Phonak hearing aid and a Naída CI sound processor at the same time. [63] [64]		
Number of Programs Processor Can Hold	**Naída CI Q70:** 5 programs per ear (10 total)[66] **Neptune™:** 3 programs[67]	4	4
Battery Type(s)	**Naída CI Q70:** PowerCels 110, 170, 230, 2 Zn-Air cartridge, & AAA PowerPak **Neptune™:** AAA Disposable or rechargeable battery[68]	CP910 and CP920: Standard Rechargeable Compact Rechargeable 2 HP 675 Disposable 1 HP 675 Disposable	**RONDO:** 3 675 disposable batteries or mini battery pack. With the mini battery pack, you can use rechargeables. **OPUS 2:** Options include DaCapo rechargeable ear-level battery, 3 675 disposable batteries if standard battery pack is used, 2 675 disposable batteries of XS battery pack is used, or one AA rechargeable, disposable battery
Battery Life	**Naída CI Q70:** PowerCel 110: up to 17 hrs, Avg: 12 hrs PowerCel 170: up to 27 hrs, Avg 18 hrs PowerCel 230: up to 36 hrs, Avg 36 hrs 2 Zn-Air: up to 56 hrs, Avg 31 hrs AAA PowerPak: up to 183 hrs **Neptune™:** NiMH AAA = range 8-21 hrs	- Standard rechargeable: up to 31 hours - Compact rechargeable: up to 18 hours - Disposable zinc air batteries: Up to 60 hours[70]	**RONDO:** Up to 5 days of use with a set of 3 high-power zinc air batteries.[71] **OPUS 2:** DaCapo average = 10-12 hours With D-Coil, Standard battery pack with 3 disposable batteries: 90 hours[40] With D-Coil, XS battery pack with 2 disposable batteries: 60 hours[72]

	Lithium AAA = range 11-30 hrs Alkaline AAA = 6-21 hrs[69]		
Low Battery Indicator	**Naída CI Q70:** The tri-color LEDs and Internal alarms are a programmable feature providing important information about the Naída CI status, battery life, program position, and error conditions.[73] **Neptune™:** featuring a tri-color LEDs and audible alarms are a programmable feature providing important information about processor status, battery life, program position, and error conditions.[74]	- Flashing Light on Processor (Can be deactivated) - Private tone in Processor - Audible tone from Wireless remote assistant - Visual display on Remote wireless assistant	Status Light- The Status Light is a small LED integrated in the all audio processors. It flashes different patterns for different errors or low battery. Private audible alert is an option in all processors.
Baby/Child Processor Options	**Naída CI Q70:** featherlite instyle™ features left and right processor clips for off-the-ear wearing when using the headpiece mic and the Naida CI Power Adapter for off-the-ear power option. The Naída CI can be programmed using IntelliLink™ to prevent use by a cochlear implant other than the one for which it has been programmed. IntelliLink is an important safety feature for very young children and bilateral implant recipients. The Naída CI can also be	LiteWear option Snugfit (3 sizes) These can be chosen for any age and lifestyle (see http://www.cochlearamericas.com/nucleus5/accessories_popup.html for photos)	BabyBTE™ Children's Battery Pack Remote Battery Pack FM Extension Battery Pack for connecting assistive listening devices or FM systems at ear-level (see http://www.medel.at/english/30_Products/01_MAESTRO/opus2/02_wearing_options.php for photos) Mini battery pack

	programmed bilaterally allowing the recipient access to up to ten programs on a single processor, up to five programs for the left ear and up to five programs for the right ear, ten total. When programmed bilaterally by your clinical professional, the Naída CI will detect which ear it is worn on and provide access to the appropriate programs for that ear.[75] **Neptune™**: Neptune™ freestyle™ processor with a variety of pediatric-friendly wearing options (armband, clip, lanyard, swim cap, headband - all available in standard and small sizes and pouches in pink, blue or grey)[76]		
How Magnet Strength is Adjusted	The UHP is AB's current headpiece and is compatible with all AB processors offering a wide range of customization for magnet configurations. If additional magnets are needed, it's recommended they should be only inserted under the direction of a cochlear implant professional. Info on the UHP can be found on AB's website.[77]	Different strength magnets can be screwed in or out to further tighten or loosen. Magnet strength can be easily adjusted by the parent or CI user without an audiologist appointment. This is convenient especially for girls whose hair thickness changes depending upon whether they wear their hair down or up in a ponytail.	Magnets can be adjusted by exchanging the magnet insert.[78]

FM Connection	**Naída CI Q70:** compatability to current FM systems through Phonak MLxi receiver. **Neptune™:** FM technology is compatible via Phonak MLxi receiver plugging directly into the Neptune controls: Neptune Connect. Any FM is also accessible through T-coil on both the Naída CI Q70 and Neptune via the T-Comm™ accessory. [79]	- Nucleus 6 Sound Processor comes with a microphone that is connected wirelessly to the sound processor. - CP920 has an accessory port that allows recipients connect to any FM system. - Any FM is also accessible through T-coil.	FM Battery Pack for easy plug and play wireless access at ear level. Allows connection to any battery-operated assistive listening device or accessory (such as an mp3 player or Bluetooth receiver) using the standard Euro connection. FM/ALD input is available on any program without the need for special settings. A stereo cable connection is also available for bilaterally implanted users to have a stereo listening experience from an mp3 player or similar.
Water Resistance	**Naida CI Q70:** IP57[80] **Neptune™:** Neptune has an IP68 rating which means it's both dust tight and waterproof. Capable of repeated and continuous submersion when controls are removed and used with the AquaMic headpiece. Neptune can be used in all terrains and is suited for treated water environments (i.e. bath or pool), ocean and lakes.[81]	IP44 (Protected against water spray from any direction) with disposable batteries. IP57 with Rechargeable battery[82] IP68 with Aqua Accessory (Approved for use in Canada. Under FDA review in the US). Approved for use in pools, ocean, lakes and river.[83]	Advertised as “water tolerant” but not to formal IP standards.
Telephone Use	**Naida CI Q70:** DuoPhone-Automatic streaming of phone calls to both ears	AutoPhone™ technology in conjunction with built-in telecoil. Recipients can automatically	Built-in Telecoil is available on any listening program.

	When using a phone, this unique Phonak feature automatically streams the caller's voice directly to both implanted ears for hearing in stereo and easier phone conversations.[84] T-Mic™ 2 - provides added convenience when using telephones and consumer electronic products.[85] **Neptune™:** Both the T-Mic™ and T-coil are available to Neptune recipients via the T-Comm™ ear-level accessory.	connect to a variety of signal sources with no manual switching. Built-in telecoil is available on any listening program.[86] There is a clip that will link the cellphone to the sound processor wirelessly.	
COMPANY COMMITTMENT			
Customer Support	http://www.advancedbionics.com/com/en/support.html	http://www.cochlearamericas.com/Support/33.asp	http://www.medel.com/us/show4/index/id/4/title/USER-SUPPORT.
(Re)habilitation Software/Programs All of these products/programs are available, either for free or for purchase, by any CI user. The auditory rehabilitation exercises in these programs apply to anyone seeking aural rehabilitation, regardless of the brand of implant use.	The Listening Room http://www.hearingjourney.com/listening_room AB support Apps http://www.advancedbionics.com/com/en/support/ab_apps.html (Available online to all for FREE)	-Sound and Way Beyond DVD http://www.cochlearamericas.com/support/2427.asp ($99 online for Nucleus recipients. Others need to call Cochlear to purchase.) - Telephone With Confidence - (Accessible through www.cochlearcommunity.com) (Free)	Bridge - to Better Communication http://www.medel.com/US/img/download/BRIDGE_Catalog.pdf (Multiple products available for purchase online. Costs range from Free to $910.)

		Hope Notes - a program uniquely developed for cochlear implant and hearing aid users designed to help improve music perception and appreciation using original songs, traditional Folk, Blues & Country styles and some familiar tunes played in unexpected ways. (https://webstore.cochlear.com/OA_HTML/ibeCCtpItmDspRte.jsp?section=10194&item=646647 (Available for $19.99 online)	
Backward Compatibility History of Processors	Naída CI Q70 – HiRes™ 90K & CII Neptune™ – HiRes™ 90K & CII Harmony – all internal cochlear implant models PSP - all internal cochlear implant models Auria - CII & HR90K S-Series - C1 and C1.2	CP910 and CP920 – CI500, CI24RE, CI422. CP910 and CP920 will be made backward compatible to N24 and N22 cochlear implant in 2015. CP810 – all internal cochlear implant models except for Nucleus 22. Freedom - all internal cochlear implant models 3G - all internal cochlear implant models ESPrint - all internal cochlear implant models	All Processors are backward and forward compatible to all internal implant models.

		Sprint – Nucleus 24 Spectra – Nucleus 22 MSP – Nucleus 22 WSP – Nucleus 22	
Initial Warranty	Internal: 10 years Processors: 3 years ESCO available for theft and loss[87] Product Warranty Summary: http://www.advancedbionics.com/com/en/support/warranty_exchangepolicy.html	Internal: 10 years Processor: 5 years repair and one time replacement for theft or loss[88] ESCO policy also available for theft and loss.	Internal: 10 years[89] Processor: 5 years including one free-of-charge replacement for a stolen, lost or damaged processor[90]
Extended Warranty Options	1 year service plan[91]	1 year service plan, 3 options, plus Advance Processor Purchase Plan providing 5 years of protection See http://www.cochlearamericas.com/Support/2166.asp for all details	A variety of service plans are available. A very low cost ESCO policy is also available.
Facilitation of Community Connections	Bionic Ear Association – BEA- http://www.advancedbionics.com/us/en/get_connected/bea.html Hearing Journey - www.hearingjourney.com www.facebook.com/advancedbionics www.twitter.com/advancedbionics www.youtube.com/advancedbionics www.linkedin.com/com	Cochlear Community – www.CochlearCommunity.com www.facebook.com/Cochlear www.twitter.com/CochlearUS www.youtube.com/CochlearAmericas http://www.linkedin.com/company/cochlear Cochlear Awareness Volunteer Network – www.CochlearAmericas.com/Volunteer	Hear Peers – www.HearPeers.com MED-EL Patient Support Team www.facebook.com/medel.hearlife www.twitter.com/medel www.youtube.com/MEDELnetwork MED-EL Community Cochlear Implant Expo Events Direct access to

	pany/advanced-bionics	Nucleus Forum http://www.cochlearamericas.com/Community/220.asp Semi-Annual Cochlear Celebration – www.cochlearamericas.com/Celebration Cochlear Implant Education Events Graeme Clark Scholarship - http://products.cochlearamericas.com/support/scholarships/nucleus	Facebook, Twitter, and YouTube through MED-EL's Smartphone App.
SAFETY			
MRI Compatibility	U.S. & Europe: Yes, .3 & 1.5 tesla with internal magnet removed	U.S. Yes, 1.5 tesla with internal magnet removed Europe: medium strength MRI up to 1.5 Tesla with magnet in place high-powered MRI up to 3 Tesla with magnet removed in a simple outpatient procedure.	U.S. Yes, FDA approved for 1.5 Tesla with magnet in place Europe 1.5 Tesla with magnet in place
Internal Implant Dimensions	Width: 28mm Length: 56mm Coil Diameter: 20mm Surgical drilling depth: 3mm	Surgical Drilling Depth: 2 mm	Concert: Housing Design Length: 45.7mm Length at stimulator: 17.3mm Width at stimulator: 25.4mm Width at coil: 29.0mm Thickness at stimulator: 4.5mm Thickness at coil:

			3.3mm Pin length 1.4mm Pin diameter 1.0mm Weight: 7.6 g[92] Sonata: Stimulator Housing Length: 17.3 mm Width: 24.8 mm Thickness: 5.9 mm Overall Implant Dimensions Length: 45.7 mm Width at coil: 29.0 mm Width at stimulator: 24.8 mm Thickness at coil: 3.7 mm Thickness at stimulator: 5.9 mm Weight: 8.6 g[93] Surgical Drilling Depth: 2 mm
Association of Processor with Specific Implant	Bilateral Processor: the Naída CI Q70 5 programs for each ear (10 total) allowing for 1 processor to work on either ear at any time.[94] Intellilink™ Safety Feature Important for young children and bilateral recipients. The Intellilink feature locks customized programs to the recipient's specific implant so that the implant cannot be activated with a different processor. Intellilink™ is also program specific with AB's latest programming software SoundWave 2.0 &	yes	IRIS™ implant identification MED-EL's unique implant identification feature, IRIS™ (Individual Recognition of the Implant System), prevents stimulation from occurring if the incorrect speech processor is worn. This is particularly important for children with bilateral implants and for school and group situations with numerous children using implants.

	newer, allowing for a single processor to be a backup for a bilateral recipient.		
Features of Electrode Array to Minimize Cochlear Damage	The HiFocus™ Mid-Scala electrode features the industry's smallest pre-curved array, the HiFocus Mid-Scala is also the industry's only pre-curved electrode developed for the latest soft surgery approaches, including round window insertion, to suit surgeon preferences and individual recipient needs. The HiFocus family of electrodes also includes two additional options, the HiFocus 1j and HiFocus Helix placed on either the inner or outer wall of the cochlea, your surgeon can choose the most appropriate type of electrode for your hearing.[95]	Softip™ A patented Softip at the end of electrode array allows for gentle insertion in order to minimize the risk of damage to the delicate cochlea structures[96] Slim Straight Array – It is the thinnest round window electrode designed for preservation. It has patented tampered basal stiffener for a smooth, single motion insertion.[97]	Specially designed electrode array with wave-shaped wiring and recessed contacts for an atraumatic electrode insertion. These soft, flexible electrodes are designed to provide the capability for Complete Cochlear Coverage (maximal use of the entire cochlea).
Case Impact Resistance	6 joules	1 joule	2.5 joules
Pediatric Friendly Features	AB programming software suite, SoundWave 2.0 and above, allows for programmable volume and sensitivity in addition to having the option to disable setting manipulation in case processor controls are bumped.	Tamper resistant battery lock N6 processor features Data Logging technology, allowing parents and processionals to monitor the amount of time the CI has been worn as well as the	Tamper resistant battery lock. SoundGuard: All processors self-monitor all programmed data continuously to protect against inconsistencies, for example as a result of static electricity. If a problem is detected

	Naída CI Q70- features left and right processor clips for off-the-ear wearing and utilization of the headpiece microphone. Additionally T-Mic™ 2 microphones are available in three different sizes to accommodate all ears of all ages. Never a wrong ear with bilateral processor feature giving parents piece of mind if processors are mixed up or when a backup processor is needed. Naída CI features a tamper-resistant Zinc-Air Battery Pak and off-the-ear AAA PowerPak as additional power options. The Neptune™ sound processor has removable controls for waterproof, childproof and smallest wearing configurations. Additionally, the controls have a built in "sync" light for situations where processor settings (i.e. volume, sensitivity, program) dials/switch are changed and therefore different to current processor settings.[98 99]	noise levels, type of input, and programs used. SnugFit accessory helps hold sound processors on little ears. Remote Assistant can be used to control bilateral processors and can be locked to prevent children from changing settings.	SoundGuard automatically stops stimulation and the Status Light flashes. By turning the processor off and on, all map information is restored, and no further action is required by the user. One FineTuner can control two processors, allowing bilaterally implanted patients the freedom from keeping track of extra accessories. Its battery lasts more than one year and is easily and inexpensively replaced.
ACCESSIBILITY			
Location of Implant Centers in Major Geographic Areas	http://www.advancedbionics.com/com/en/you	See http://cochlear.com/wps/wcm/connect/intl/ho	http://www.medel.com/us/clinic-finder/

	r_journey/find_a_clinic.html	me/connect/find-a-clinic to find a clinic near you.	
Number of Recipients Worldwide	38,000+	200,000+	

*DISCLAIMER – This brand comparison chart is NOT affiliated with Cochlear, MED-EL, and Advanced Bionics. Please use it at your own discretion, and we still recommend consulting with the CI manufacturing companies, surgeons, and audiologists to get more information.

©2013 Cochlear Implant Online Last Updated 10/27/2013 Rachel Chaikof, Melissa Chaikof, Elizabeth Rosenzweig.
Special thanks to employees at cochlear implant manufacturing companies for providing information and checking facts.

Images are provided courtesy of Advanced Bionics, Cochlear Americas and MED-EL.

[1] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/professional/AB_HiRes_Fidelity_120_clinical_results.pdf
[2] http://www.professionals.cochlearamericas.com/sites/default/files/resources/FUN656_Pitch%20Steering_WhitePaper.pdf
[3] Dual-electrode pitch discrimination with sequential interleaved stimulation by cochlear implant users. Kwon BJ, van den Honert C. 2006. http://www.ncbi.nlm.nih.gov/pubmed/16875252
[4] Pitch Percepts
[5] http://www.medel.com/US/img/download/20869_FineHearing.pdf
[6] Ibid.
[7] Ibid.
[8] Ibid.
[9] Brough et al. (2010) Speech discrimination scores using the latest generation of speech processors
[10] Ibid.
[11] Ibid.
[12] http://www.advancedbionics.com/com/en/products/sound_processing/autosound.html
[13] http://www.advancedbionics.com/com/en/products/sound_processing/clearvoice.html
[14] http://www.advancedbionics.com/com/en/products/sound_processing/phonak_binaural_voicestreamtechnology.html
[15] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/smartsound-iq/smart-sound-iq-read-more-
[16] http://www.cochlearamericas.com/Products/384.asp
[17] http://www.cochlearamericas.com/Products/2180.asp
[18] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/professional/AB_ClearVoice_White_Paper.pdf
[19] http://www.advancedbionics.com/com/en/products/sound_processing/hires_fidelity_120.html
[20] http://www.advancedbionics.com/com/en/products/sound_processing/autosound.html
[21] http://www.advancedbionics.com/com/en/products/accessories/t-mic.html
[22] http://www.advancedbionics.com/content/dam/ab/Local/gc_com/iPad_Content_NA/Hear%20Your%20Best%20bro_NA_ENGLISH..pdf
[23] http://www.advancedbionics.com/content/dam/ab/Local/gc_com/iPad_Content_NA/Hear%20Your%20Best%20bro_NA_ENGLISH..pdf
[24] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/smartsound-iq/smart-sound-iq-read-more-
[25] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/smartsound-iq/smart-sound-iq-read-more-
[26] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/smartsound-iq/smart-sound-iq-read-more-
[27] http://www.cochlearamericas.com/Products/2180.asp
[28] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/smartsound-iq/smart-sound-iq-read-more-
[29] http://www.cochlearamericas.com/Products/384.asp
[30] http://www.cochlear.com/files/assets/N34422F_ISS5_EN_Breaking-barrier-brochure_lr.pdf
[31] Sabine Haumann Thomas Lenarz Andreas Büchner. Speech Perception with Cochlear Implants as Measured Using a Roving-Level Adaptive Test Method. ORL 2010;72:312–318
[32] http://www.advancedbionics.com/com/en/products/sound_processing/clearvoice.html
[33] http://www.advancedbionics.com/com/en/products/sound_processing/autosound.html
[34] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/smartsound-iq/smart-sound-iq-read-more-
[35] MED-EL FSP Clinical Trial, 2008. Data on file at MED-EL.

[36] http://www.advancedbionics.com/com/en/products/accessories/t-mic.html
[37] http://www.advancedbionics.com/com/en/products/accessories/t-mic.html
[38] http://www.advancedbionics.com/com/en/products/hifocus_electrodefamily.html
[39] http://www.cochlear.com/files/assets/corporate/pdf/COH-AR_2011_ED_110831.pdf
[40] http://www.cochlear.com/files/assets/corporate/pdf/COH-AR_2011_ED_110831.pdf
[41] http://www.cochlear.com/files/assets/corporate/pdf/COH-AR_2011_ED_110831.pdf
[42] IDR Range of sound heard from softest to loudest. Normal hearing dynamic range = 120 db.
[43] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/candidate/AB_Cochlear_Implant_Technology_Comparison_Chart.pdf
[44] http://www.medel.com/us/show/index/id/119?PHPSESSID=ujg1u9b5m466kn1h7luh5j6vp0
[45] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/candidate/AB_Technology_Reliability_Report_2012.pdf
[46] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/candidate/AB_Historical_Implant_Reliability%20Report_2012.pdf
[47] http://professionals.cochlearamericas.com/sites/default/files/resources/FUN2012%20ISS4%20APR12%20Implant%20Reliability%20Report_4.pdf
[48] Ibid.
[49] Ibid.
[50] http://www.theaustralian.com.au/business/wall-street-journal/failure-rate-of-cochlears-nucleus-5-implant-rises/story-fnay3vxj-1226492387210
[51] http://www.medel.com/int/show/index/id/280/titel/Outstanding+Reliability+Data?PHPSESSID=rubav9jvcaatv7litob81si756
[52] Ibid.
[53] Ibid.
[54] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/candidate/AB_Technology_Reliability_Report_2012.pdf
[55] Letter from Manager Director of Advanced Bionics Europe, Middle East, Africa to a Professor. 18 June 2009.
[56] http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfRES/res.cfm?id=35401
[57] http://www.accessdata.fda.gov/psn/printer-full.cfm?id=11
[58] http://www.cochlearamericas.com/newsletters/surgeon-letter-080312.html
[59] http://www.theaustralian.com.au/business/companies/product-recall-wipes-835m-off-cochlears-value/story-fn91v9q3-1226135221282
[60] http://www.advancedbionics.com/com/en/naida_ci_q70.html
[61] http://www.advancedbionics.com/com/en/products/processors/Neptune.html
[62] http://www.advancedbionics.com/com/en/products/accessories/connectivity.html
[63] http://www.advancedbionics.com/com/en/products/accessories/connectivity.html
[64] http://www.advancedbionics.com/com/en/products/sound_processing/phonak_binaural_voicestreamtechnology.html
[65] http://www.cochlear.com/wps/wcm/connect/intl/home/discover/cochlear-implants/the-nucleus-6-system-/nucleus-6-for-adults/nucleus-6-sound-processor/connect-today-and-be-wireless-ready/connect-today-and-be-wireless-ready
[66] Naida user guide page 12: http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Naida_CI_Q70_User_Guide.pdf
[67] Neptune user guide page 7: http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Neptune_User_Guide.pdf
[68] http://www.advancedbionics.com/com/en/products/accessories/power.html
[69] http://www.advancedbionics.com/com/en/products/accessories/power.html
[70] http://nucleus5.cochlear.com/uk/safe-powerful-battery-choices
[71] http://www.medel.com/us/rondo
[72] http://www.medel.com/us/show2/index/id/790?versioncode=25b32e8c0f
[73] Naída CI user guide page 25-26: http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Naida_CI_Q70_User_Guide.pdf
[74] Neptune user guide page 16-17: http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Neptune_User_Guide.pdf
[75] http://www.advancedbionics.com/com/en/naida_ci_q70/instyle.html
[76] Naida user guide page 12:

http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Naida_CI_Q70_User_Guide.pdf
[77] http://www.advancedbionics.com/com/en/professionals/training_library.html
[78] http://www.medel.com/us/opus2
[79] http://www.advancedbionics.com/content/dam/ab/Local/gc_com/iPad_Content_NA/Hear%20Your%20Best%20bro_NA_ENGLISH..pdf
[80] http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Naida_CI_Q70_User_Guide.pdf
[81] http://www.advancedbionics.com/com/en/products/processors/Neptune.html
[82] http://products.cochlearamericas.com/products/introducing-nucleus-system/2-nucleus-system/water
[83] http://products.cochlearamericas.com/products/introducing-nucleus-system/2-nucleus-system/water
[84] http://www.advancedbionics.com/com/en/products/sound_processing/phonak_binaural_voicestreamtechnology.html
[85] http://www.advancedbionics.com/us/en/products/accessories/t-mic.html
[86] http://products.cochlearamericas.com/cochlear-implants/nucleus-system/getting-connected
[87] http://www.advancedbionics.com/com/en/support/warranty_exchangepolicy.html
[88] http://products.cochlearamericas.com/support/cochlear-implants/warranty-information and http://www.cochlear.com/au/warranty
[89] http://www.medel.com/US/img/download/maestro3.0_faq.pdf
[90] http://www.medel.com/data/editor/file/press_releases_US/5-Year-Warranty.pdf
[91] http://www.advancedbionics.com/com/en/support/warranty_exchangepolicy.html
[92] http://www.medel.com/data/downloads/MAESTRO/22676_CONCERTO_Factsheet_English.pdf
[93] http://www.medel.com/data/pdf/20404.pdf?PHPSESSID=ujg1u9b5m466kn1h7luh5j6vp0
[94] Naida user guide page 12:

http://www.advancedbionics.com/content/dam/ab/Global/en_ce/documents/recipient/AB_Naida_CI_Q70_User_Guide.pdf
[95] http://www.advancedbionics.com/us/en/products/hifocus_electrodefamily.html
[96] http://www.cochlear.com/uk/delivering-choice
[97] http://www.cochlear.com/wps/wcm/connect/us/for-professionals/cochlear-implants/Products/implants-and-instrumentation/CI422-slim-straight
[98] http://www.advancedbionics.com/com/en/products/accessories/t-mic.html
[99] http://www.advancedbionics.com/com/en/products/accessories/power.html